Notice of Allowability	Application No.	Applicant(s)	
	09/960,283	NAKAI, TAKEHIKO	
	Examiner	Art Unit	
	Leo Boutsikaris	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *RCE filed on 5/4/2004*.

2. ☒ The allowed claim(s) is/are *1-25*.

3. ☒ The drawings filed on *24 September 2001* are accepted by the Examiner.

4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 5/4/2004 has been entered.

Allowable Subject Matter

Claims 1-25 are allowed.

Claims 1-24 are allowable over the prior art of record for at least the reason that even though the prior art discloses plural laminated diffraction gratings formed on curved surfaces, the prior art fails to teach or reasonably suggest, regarding claims 1-15, a diffractive optical element, wherein the diffraction grating from among the at least two diffraction gratings, wherein a curvature radius of the curved surface and a curvature radius of a grating surface in a portion where a grating pitch is largest, have different signs, is the one which has the smallest grating thickness, regarding claims 16-22, a diffractive optical element having a plurality of laminated diffraction gratings, wherein in one of the two diffraction gratings, an optical power attributable to diffraction and an optical power attributable to refraction of the curved surface have mutually

different signs, and in the other diffraction grating, an optical power attributable to diffraction and an optical power attributable to refraction of the curved surface have the same sign, and the one diffraction grating has a grating thickness smaller than the other diffraction grating, regarding claims 23-24, a diffractive optical element having a plurality of laminated diffraction gratings, comprising a first diffraction grating provided on a curved concave surface and having positive optical power, and a second diffraction grating provided on a curved convex surface and having positive optical power, wherein the first diffraction grating has a grating thickness smaller than the second diffraction grating, as set forth by the claimed combination.

Regarding claim 25, even though the prior art discloses plural laminated diffraction gratings at least one of which is formed on a curved surface, and such that an optical power attributable to diffraction has a sign different from that of an optical power attributable to refraction at that curved surface, the prior art fails to teach or reasonably suggest a diffractive optical element having a plurality of diffraction gratings laminated where the diffraction grating formed on the curved surface and having optical power due to diffraction having opposite sign of refraction power at that surface, has a smallest grating thickness among the plurality of diffraction gratings, as set forth by the claimed combination.

The most pertinent art is Ogawa (US 6,473,232, Fig. 10), wherein two diffraction gratings 23 and 24 are formed on curved surfaces 21a and one (unnamed in the Figure) parallel to 21a, respectively. The grating with the smallest grating thickness is 23 (lines 46-67, col. 10). However, in the above optical element, in the grating with the smaller thickness, 23, and at the region where the pitch is largest (section closest to the axis O), the curvature radius of the curved surface 21a and the curvature radius of the grating surface have the same sign. Cohen (US

5,117,306, Figs.7- 8) discloses diffraction bifocal lenses wherein two diffraction gratings are accumulated upon each other. However, in the embodiment of Fig. 7, the grating, PL, in which the curved surface thereof and the curved surface of the substrate upon which it is formed, have different signs, is not specified as being the one with the smallest grating thickness; and in the embodiment of Fig. 8, the second grating II is not formed on a curved surface. Cohen (US 5,120,120, Fig. 16) and Londono (US 5,260,828, Figs. 10-12) disclose a lens having a grating on each of its curved surfaces. However, they do not disclose the relation between the depths of each grating, or the sign of the diffractive power of the diffractive elements.

Regarding claim 25, grating 23 in Fig. 10 of Ogawa has a diffractive power of the same sign as the refraction power at the curved surface 21a (e.g., both are negative). Grating 108 in Fig. 10 of Londono is positive and is formed on a concave surface 110. However, the thickness of gratings 108 and 104 is not specified. Similarly grating 72 in Fig. 7 of Nakai (EP 1072906) is positive and the surface 72c is negative. However, thickness d3 is not specified. Finally, Cohen (5,117,306, Fig. 8) and Cohen (5,120,120, Fig. 16) disclose plural laminate diffraction gratings, where at least one is formed on a concave surface and having positive diffraction power, but without any disclosure of relevant grating thicknesses.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Leo Boutsikaris whose telephone number is 571-272-2308.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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